Global Simulation of Sulfate Aerosol Using a Coupled Chemistry/Climate Model

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Sulfate aerosols can affect global climate both directly by scattering solar radiation and indirectly by altering the cloud droplet size distribution. Therefore, knowledge of the spatial distribution of natural and anthropogenic sulfate aerosol is important.

We have recently coupled GRANTOUR, our global chemistry and transport model with the ECHAM climate model which provides several enhanced capabilities in the representation of aerosol interactions. ECHAM includes a specific representation of liquid water in large-scale clouds which allows us to represent wet phase gas-to-particle conversion of SO_2 to sulfate as well as improving the parameterization of precipitation scavenging.

Results from simulations will be compared to observations of scavenging and deposition of sulfate aerosols and to spatial distributions from earlier simulations based on CCM1. We also calculate the climate forcing due to anthropogenic sulfate as the difference in top of the atmosphere solar radiation when the solar radiation routine is called with and without the anthropogenic sulfate component.

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